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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/615,042	07/08/2003	Valeriy Sukharev	03-0509	3892
24319	7590	11/09/2004	EXAMINER	
LSI LOGIC CORPORATION 1621 BARBER LANE MS: D-106 MILPITAS, CA 95035			FENTY, JESSE A	
			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 11/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/615,042

Applicant(s)

SUKHAREV ET AL.

Examiner

Jesse A. Fenty

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/14/04 has been entered.

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 8-10 and 14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention:

*a.* The specification and drawings do not disclose the “intermediate interconnect liner comprised primarily of Aluminum.”

*Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-14 are rejected under 35 U.S.C. 102(b) as being anticipated by McTeer (U.S. Patent No. 6,204,179 B1).

In re claim 1, McTeer discloses a method of forming an interconnect in a substrate which includes one or more dielectric layers and a copper deposit, said method comprising:

forming a trench in the substrate (column 17, lines 8-10); forming a via in the substrate to the copper deposit; depositing an interconnect liner layer (6) of aluminum-copper alloy comprised primarily of Aluminum in the trench and via; depositing copper onto the aluminum-copper alloy interconnect liner layer (column 21, lines 20-26); and polishing the copper (column 20, lines 24-28).

In re claim 2, McTeer discloses the method of claim 1, wherein the step of depositing a layer of aluminum-copper alloy comprises depositing aluminum – 0.5% copper alloy using a PVD technique (column 18, lines 15-27).

In re claim 3, McTeer discloses a method of forming an interconnect in a substrate which includes one or more dielectric layers and a copper deposit, said method comprising:

Forming a trench in the substrate (column 17, lines 8-10); forming a via in the substrate to the copper deposit; depositing an intermediate liner layer (4) in the trench and via and on the copper deposit; depositing an interconnect liner layer (6) of aluminum-copper alloy comprised

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primarily of Aluminum on the intermediate layer (column 21, lines 20-26); depositing copper into the aluminum-copper alloy; and polishing the copper (column 20, lines 24-28).

In re claim 4, McTeer discloses the method of claim 3, wherein the step of depositing a layer of aluminum-copper alloy comprises depositing aluminum – 0.5% copper alloy using a PVD technique (column 18, lines 15-27).

In re claim 5, McTeer discloses the method of claim 3, wherein the step of depositing an intermediate liner layer comprises depositing TaN (column 17, lines 62-65; column 18, lines 1-3).

In re claim 11, McTeer discloses the method of claim 1, further comprising depositing the interconnect layer such that said interconnect layer is in contact with the copper deposit (3).

In re claim 12, McTeer discloses the method of claim 1, wherein the step of depositing the interconnect liner layer comprises depositing a layer of aluminum – 0.5% copper alloy.

In re claim 13, McTeer discloses the method of claim 3, wherein the step of depositing the interconnect liner layer comprises depositing a layer of aluminum – 0.5% copper alloy.

In re claim 6, McTeer (Fig. 11) discloses an interconnect in a substrate which includes one or more dielectric layers, said interconnect comprising a first copper deposit (15), a second copper deposit (3), and an aluminum-copper alloy interconnect liner (6) comprised primarily of Aluminum (column 18, lines 16-18) disposed between and in (electrical) contact with the first and second copper deposits and between the second copper deposit (3) and at least one of the dielectric layers (14).

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In re claim 7, McTeer discloses the device of claim 6. The limitation, “wherein the ... has been deposited using a PVD technique,” refers to the process for making this product. Applicant is reminded that a “product by process” claim is directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); *In re Marosi et al*, 218 USPQ 289; and particularly *In re Thorpe*, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a “product by process” claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in “product by process” claims or not. Note that applicant has the burden of proof in such cases, as the above caselaw makes clear. Therefore, since McTeer disclose the aluminum-copper alloy structure in the same manner as the claimed structure, the prior art meets the claim.

In re claim 8, as best understood, McTeer (Fig. 11) discloses a semiconductor device comprising:

An interconnect in a substrate which includes one or more dielectric layers, said interconnect comprising a first copper deposit (15), a second copper deposit (3), an intermediate interconnect liner (4) and disposed between the first and second copper deposits and in contact with the first copper deposit (15); and an aluminum-copper alloy (6) interconnect liner disposed between the first and second copper deposits between the second copper deposit and at least one of the dielectric layers, and in contact with the second copper deposit (3).

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In re claim 9, McTeer discloses the device of claim 8. The limitation, "wherein the ... has been deposited using a PVD technique," refers to the process for making this product and is not given patentable weight regarding the structure of this claim. See above.

In re claim 10, McTeer discloses the device of claim 8, wherein the intermediate interconnect liner comprises TaN (column 17, lines 62-64).

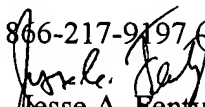
In re claim 14, McTeer discloses the device of claim 8, wherein said aluminum-copper alloy interconnect liner comprises a layer of aluminum – 0.5% copper alloy.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse A. Fenty whose telephone number is 571-272-1729. The examiner can normally be reached on 5/4-9 1st Fri. Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Jesse A. Fenty  
Examiner  
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